[CON 5] THE PERCEPTIONS OF CONSTRUCTION CONTRACTORS TOWARDS SUSTAINABLE CONSTRUCTION IN PERAK, MALAYSIA

Nor Masliha Daud[1] & Noorulsadiqin Azbiya Yaacob[2]
[1-2]School of Technology Management and Logistics, College of Business, Universiti Utara Malaysia, 06010 UUM Sintok, Kedah
maslihanor@gmail.com[1], noorulsadiqin@gmail.com[2]

ABSTRACT

The most significant impact of damaged environmental is because of the expanded construction industry. Construction industry not only affects the environment but also social and economic. This concerns the essentials elements of sustainable constructions adopting in Perak because Perak have the most of contractors. Sustainability is not harmful to the quality of the environment or the reduction of natural resources, and thereby supporting the long-term ecological balance. So, the studies aim to investigate the perceptions contractors in Perak towards environmental, social and economic of sustainable construction. The study conducted via questionnaire, which is obtained contractor response through these issues. Quantitative data were analyzed through descriptive analysis and statistical inference. This study show that the important of application sustainable in construction sector, which is this method give an impact positive to environmental, social, and economy to make sure that this method can adopt new technology implementation without compromising with quality and standard of constructions itself. Thus, sustainable construction in Perak is still in its infancy. The lack of the commitment by all players in the construction industry especially contractors are required in order to achieve sustainable construction in Perak, Malaysia.

Keywords: *sustainable construction, perceptions, construction industry, contractor, environment*

INTRODUCTION

The continuous use from environment would occur some damaged to environmental, social and economic. Based on industry that was listed, constructions industry faces a big challenge which is become a major contributor to environmental pollution or impacts. It is because construction was involve with many activities even before started the project, in progress and also when the finish of the constructions. Sustainability construction is about creating, maintenance and operation of infrastructure and buildings that are environmentally friendly, generates in long time wealth and enhances the quality of life. Through this sustainable construction we can be decide that as investment in the future. But others study revealed that social and economic factors requested for sustainability too.

Then, the sustainable was created to the change and development. The sustainable construction is about minimizing such negative effects. This is must be used to construction industry because to pursuit manner among the players in constructions

industry. The implementation sustainable in construction would achieve win-win outcome environment, society and economy. To implement the sustainable in construction, all players in construction must corporate to pursuits the purpose of sustainability construction. Clients, contractor, consultant, superintendent officer, workmen, and people that involve in work to construct the construction was a players that include in construction. However, in this study only focus on contractors. This study investigates about the general knowledge and understanding of construction contractors to aspect of sustainability amongst construction contractors in Perak, Malaysia.

PROBLEM STATEMENT

It is already discussed that constructions industry is one of the major contribution to problem for environmental which is 40% of all resources consumption is product of all 40% waste was estimated. Constructions industry was involve with many activities that gives impact to environment like Shen et al., 2005 states that the current process construction, the effect of environmental project including air pollution, emissions of sulfur dioxide, and degradation of water quality, noise pollution, and solid waste generation.

Sustainable construction must be implement into constructions industry because with sustainable the environment can be protect and continuous to next generation enjoyed. Over a constructions activities lifecycle, all activities that have been conducted in constructions activities trigger a number of environmental problems. While focusing only to environmental, at the same time social and economic also be reflected. Social and economic should be in attention because the only focus before environmental is social and economy performance that played an important role in constructions industry.

One of the researchers stated knowledge and awareness of construction contractors on the sustainable construction as moderate. But, why sustainable in construction is still in moderate whereas have many methods from responsible parties have been done? In particular, this studies aim to investigates the awareness of contractor regards to environmental of sustainable development and it is also investigates the understanding toward social and economic of sustainability amongst contractor in Perak. Then, optimize the effectiveness protection of the environment.

LITERATURE REVIEW

Sustainable construction and sustainable development

In the past, sustainable construction was known as “Intelligent Buildings”, “Energy Efficient Building”, and “Green Buildings”. It would be recognized when examine the concept behind the word. So, sustainable construction is not something new terminology to people that already involve in construction in long times. Sustainable construction is about projects, engineering and renovation of promote the benefits of environmental, social and economic present, helping to create a good quality of life for today and for future generations.

Sustainable construction and sustainable development are intertwined. Sustainable development is about created the infrastructure and construction ways that does not damage the environmental, does not much depend on rapidly diminishing resources and conserve virgin material. The quality of life and customer satisfaction bids, offers flexibility and the potential is set process where industry beneficial and competitive delivers built an outcome to accommodate changing user in the future which is supports the natural and social environment of fair and maximize the efficient use of resources (Suliman & Abdelnaser, 2009).

Effect from construction

Construction poses problems such as pollution emissions, waste, noise, and dust, and is a source of harassment, like temporary road, and block of the sidewalks. Like (Patermann, 1999) said there is growing concern because the use of resources may effected over of the environmental on livings health and productivity. Refer to (A. Klang, 2003) and (CIB, 1998), construction industry made a positive benefits to society, but it also has a negative impact on the environment such as soil erosion, sedimentation, floods, destruction of vegetation, dust pollution, the reduction of natural resources that can harm living health.

The main contributor of construction industry is the reduction of natural resources and cause side effects that unsought as air and water pollution, solid waste, deforestation, toxic waste, health hazards, global warming and other negative effects (Augenbroe, 1998). On this world, the construction industry is responsible for the pollution from energy use and during extraction, processing and transportation of raw materials. (Ding, 2005).

Criticism comment got for construction project from peoples for their contribution to soil, air, and water pollution and waste, noise, dust, and their harmful emissions (Fuertes, 2013). It gives the main factor causing the increase in global temperature and the construction industry face the challenge of increasing pressure from stakeholders and regulatory agencies to eco-friendly practices in day to day business (Ahn, 2013).

An environmental view of sustainability construction

The American Society of Testing and Materials (ASTM) Standard 2114 - 06a defined the term "green building" as a building that offers a building specified requirements while minimizing disruption and improving the functioning of ecosystems at the local, regional and global levels during and after construction, and otherwise the service life. This definition insists that green construction should provide both accessibility contemporary structures (Glavinich). It is impossible to carry out building projects without measuring environmental impact. This will help them in decision-making environment-friendly projects (San-Jose, Losada, Cuadrado, & Garrucho, 2007). To build a sustainable a firm designed and friendly environment that must be followed during the construction process, efficient use of resources. Therefore, sustainability built by the principles of sustainable and ecological design (Kibert).

Parkin (2000) said that sustainable construction activities can create a sense of environmental responsibility, awareness among the parties involved, and economic benefits. To carry out special concept such sustainable construction environmental consciousness require technology changes in the production process as an example of optimizing the use of materials, reduced energy consumption at the site, as well as

reducing waste and equipment that cultural and behavioral output of the production process such as eco-homes and green building (Weston, 2011).

The economic and social view in sustainable construction

The construction industry is constantly exploring the economic dimension, which clarify most of the project by the contractor with the lowest bid. This is courage for sustainable construction goal that frequently dependent on the long-term outlook, The most effective way to stimulate sustainable development is through economic measures based on the market that affect individual economic agents in the short term and the long term (Bon, 2000).

The built environment is one of the infrastructures that support the main building, economic development and construction has an impact to the reference resources such as land, materials, energy, water, human capital and social and working and the living environment. Thus, the construction industry has a lot of direct contact and indirectly by various sustainable developments (CIB, 1998). Construction industry is exploring the economically but this explains why most of the time the project was awarded to the contractor with the lowest tender (D. Ekundayo, 2011). As tender of the past used to be guide by the economic factors that the return on short-term effects on social issues and the environment which also take into the long-term benefits asset (OCG, 2007).

Higher awareness in measuring the impact on society is in response not only the need to reduce the environmental impact of construction activity but the corporate sustainability agenda has given something good to help the community. Organizations that not only expected to accept the concept of sustainability but also to use the principles as a way of doing business and managing knowledge assets to facilitate the achievement of the organization's continuous improvement (Robinson, Anumba, Carrillo, & Al-Ghassani, 2006). Questionnaire was seeks to examined the accuracy of the problems and effects to make recommendations on this study.

RESEARCH METHODOLOGY

This methodology used an investigation technique like Likert scales which are obtained the perceptions and attitudes respondents. However, this studies carrying of two section form of questionnaire. In the first, the questionnaires more focus on the environmental aspect and on the second focus on social and economic aspect. The questionnaires have asked the participants to rate using scale from “never” to “always” and “strongly disagree” to “strongly agree”. The aim is to investigate the awareness and understanding of a construction contractor observing the environmental, social and economic sustainable development. Ensure that the instructions, language, mass merchandise, and understand the questions used in the questionnaire is clear, the pilot study was conducted.

To helped respondents, a base of web questionnaire was created. The copy of link of web based was sent to respondent by email. 139 a questionnaire divided amongst construction contractor that working at site construction in Perak, Malaysia. Out of total, 74 were filled in and returned. Respondents represent a various range of age and experience in industry. The main reason is to survey that the contractor got the real situations about the sustainability within the construction sites. Therefore, the role of

contractor in whole process is quite crucial and it was important to survey their perceptions about sustainability. IBM SPSS Statistics version 22 software have used to make a data analysis from the resulted respondents.

DISCUSSION AND IMPLICATION

The questionnaire divide by two section which is first about environmental (E) and second about social and economic (SE). The contractors were asked regarding their perception of the sustainable construction. As a contractor the biggest issue to go on with a project is financial and the availability materials. The questionnaire survey forms were given out to local constructions contractor that involved with the Perak construction industry.

Table 1
Descriptive respondent

Category	Respondent	
	Number	%
Age		
20 – 29 years	29	39.19
30 – 39 years	34	45.95
40 – 49 years	9	12.16
50 – 59 years	2	2.70
Year of experiences		
1 – 5 years	24	32.43
6 – 9 years	33	44.59
>10 years	17	22.97

The largest respondents come from 45.95% contractor 30 - 39 years old, followed by contractor 20 – 29 years old 39.19%, 12.16% contractor aged 40 – 49 years old and 2.70% contractor 50 – 59 years old. Of the respondent surveyed, 44.59% had between 6 – 9 years of experiences. The results reveal 32.43% is from 1 – 5 years in experiences and 22.97% belongs to contractor who had experiences more than 10 years. The decision is significant as it is just to make sure that readers can understand the differences in perception of the rest of the experience acquired with the contractor.

Reliability of questionnaires

The reliability of the questionnaires was calculated using Cronbach's Alpha coefficient based on the internal consistency method. As a rule thump, states that Alpha level of 0.8 or greater are acceptable. The study show Alpha coefficients were verify as 0.72 for stage one that investigated about environmental and for stage two the Alpha is about 0.78 that investigated about sustainability affected social and economic. So, the Cronbach's Alpha coefficient for all, raged is between 0.72 and 0.78 which mean the results are dependable.

Table 2
Reliability statistics environmental

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
719	.721	5

Table 3
Reliability statistics social and economic

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.780	.787	6

Table 4
Correlations

		E	SE
E	Pearson Correlation	1	.396**
	Sig. (1-tailed)		.000
	N	74	74
SE	Pearson Correlation	.396**	1
	Sig. (1-tailed)	.000	
	N	74	74

**. Correlation is significant at the 0.01 level (1-tailed).

Pearson's r is 0.396. This number is very close to 0. This means that the relationship between two variables is weak base on the Pearson's r. This means that changes in one variable are not correlated with changes in the second variable. If Pearson r 0.396, we can conclude that the variables not strongly correlated variables. This means that as one variable increases in value, the variable must also increase the value. Similarly, as the value of one variable, the variable must also go down in value. This is called a positive correlation. Pearson's r value of 0.396 was positive.

Regression

Table 5
Coefficients[a]

		Unstandardized Coefficients		Standardized Coefficients			
Model		B	Std. Error	Beta	t	Sig.	R^2
1	(Constant)	2.480	.354		7.007	.000	
	SE	.339	.093	.396	3.665	.000	0.157

a. Dependent Variable: E

The regression techniques have been used to test the level of awareness construction contractor toward sustainable construction. Based on the result founded the R2 factor of 0.157 indicated that the 15.7% variance to increase the environmental. The examination resulted significant t ($p<0.05$). Then, the SE showed the 0.000 of significance to environmental. Then, the SE (beta = 0.396) give to the prediction of improve in environmental.

CONCLUSION

To implement the sustainable construction we need to make sure that everyone in every party in construction activities knows what the sustainability in constructions. To make them know many methods we can approach. The increasing awareness level on sustainable in construction among contractors can conserve three aspect that we highlighted such environment protection, social well-being, and economic prosperity. This three aspect is very important to country development parallel with the continuously protection to flora and fauna.

First is environment protection. We can sustained environmental protection with effective environmental management, management and control and prudent use of natural resources. For example in environmental protection on the location and land use, selection of materials, energy conservation, water quality, minimize waste, pollution control and biodiversity and ecology. The second is to improve people's welfare and quality of life of the customer relationship and satisfaction. We can get many worker's well-being and community benefits. Third is about economic prosperity which is has micro and macro benefits. It can generate profits without neglecting the needs of the future. In addition, in the field of sustainable construction have high maintenance and can be stable in the growth stage. Such as the overall cost of living, business improvement, regulatory compliance, cost efficiency and risk assessments.

Adoption of sustainable development is essential for construction industry as alternative of the conventional green constructions. While the result indicate it is show the respondents have a positive attitudes to use material especially recycle materials and materials from waste management. They already know that cost effectiveness by use locally sources, labor, and claimed commitment to practice. Other than that, most of respondents agreed with statement that favored social and economic aspects of sustainable constructions and utilize these practices. Based on the responses that achieved from questionnaires, the most of the contractors are known of the issue of the triple bottom line like environmental, social and economic. But sustainability in constructions is still in infancy in Perak due the high constructions cost and the lack of consciousness about important of sustainability in construction industry. However, on Eight Malaysia Plan (2001 – 2005) the issue of sustainability is emerging as one of the key issues. So, with this the cost of green material can got incentives like rebate and the construction cost would be reduced. These factors will finally excite sustainable construction in the future in Perak.

REFERENCES

Abidin, N.Z. (2009). Sustainable Construction in Malaysia–developers' awareness. *World Academy of Science, Engineering and Technology*, *53*, 807-814.

Abidin, N.Z. (2008) Sustainable Practices in Malaysia: Are We Ready for It. *Global Conference on Global Warming*, 379-388.

A. Klang, P. A., Vikman, H. Brattebo (2003). Sustainable Management of Demolition Waste: An Integrated Model for the Evaluation of

Environmental, Economic and Social Aspects. *Resources, Conservation and Recycling*, *38*, 317-334,

Bing, L., Kwong, Y.W., & Hao, K.J. (2001). Seismic Behaviour of Connection between Precast Concrete Beams. *CSE Research Bulletin*, *14*.

Chan, Y. H., Lee, B. C., & Lee, J. C. (2014). Sustainability in the Construction Industry in Malaysia: The Challenges and Breakthroughs. *World Academy of Science, Engineering and Technology*, *8*.

Eight Malaysia Plan, *Eight Malaysia Plan 2001-2005.* Kuala Lumpur: Percetakan Nasional Malaysia, 2001.

CIDB Malaysia (2007). Strategic Recommendations for Improving Environmental Practices in Construction Industry. Kuala Lumpur: CIDB Publisher.

N. Zainul Abidin. (2005). Using Value Management to Improve the Consideration of Sustainability within Construction. Ph.D. Thesis, Loughborough University, United Kingdom.

WS Atkins Consultants. (2001). *Sustainable Construction: Company Indicator*. CIRIA C563. London: CIRIA.

G. Ofori, C. Briffett, G. Gang, & M. Ranasinghe. (2000). Impact of ISO 14000 on Construction Enterprises in Singapore. *Construction Management and Economics, 18*, 935-947.

G. Ofori (1992). The Environment: The Fourth Construction Project Objective? *Construction Management and Economics*, *10*, 369-395.

G. K. Ding (2005), "Developing a Multi Criteria Approach for the Measurement of Sustainable Performance," *Building Research & Information*, *33*, 3-16.

Hwang, B. G., & Tan, J. S. (2012). Sustainable Project Management for Green Construction: Challenges, Impact and Solutions. In *Proceedings of CIOB World Construction Conference 2012*.

Horvath, A. (1999). Construction for sustainable development–A research and educational agenda. *Construction Engineering and Management Program, University of California Berkeley*, 1-7.

Khalfan, M., Noor, M. A., Maqsood, T., Alshanbri, N., & Sagoo, A. (2015). Perceptions towards Sustainable Construction amongst Construction Contractors in State of Victoria, Australia'. *Journal of Economics, Business and Management*, *3*(10), 940-947.

Mohamed, S., Seow, T., Goh, K. C., Masrom, M. A. N., Rahim, A., & Izwan, M. H. (2014). The Management of Sustainable Development at Malaysian Local Government: Stakeholders' Perception.

OGC. (2007). Whole-life Costing and Cost Management, Office of Government commerce. *The Achieving Excellence Procurement Guides 07*, London 2007.

PAC. (September 2009). Leed and Building Green, Protrend Arrow. Construction LEED. [Online]. Available: http://www.protrend-arrow.com/about/leed.

Parkin, S. (2000). Sustainable Development: The Concept and the Practical Challenge. *Proceedings of the Institution of Civil Engineers: Civil Engineering*, *138*, 3-8.

Salama, M., & Hana, A. R. (2010, September). Green Buildings and Sustainable Construction in the United Arab Emirates. In *Proc. 26th Annual ARCOM Conference* (pp. 1397-1405).

Shen, L.Y., Vivian, W.Y.T., Leona, T., Ji, Y.B. (2010). Project Feasibility Study: The Key to Successful Implementation of Sustainable and Socially Responsible Construction Management Practice. *Journal of Cleaner Production*, *18*, 254-259.

Suliman, L. K. M., & Omran, A. (2009). Sustainable Development and Construction Industry in Malaysia. *Manager (University of Bucharest, faculty of business & administration)*, 10.

S. Parkin. (2000). Sustainable Development: The concept and the Practical Challenge. Proceedings of the Institution of Civil Engineers: Civil Engineering, 138(special issue 2), 3-8.

S. Parkin. (2000). Contexts and Drivers for Operationalizing Sustainable Development, *in Proc. the ICE-Civil Engineering*, 9-15.

V. W. Y. Tam, & K. N. Le. (2006). Environmental Assessment by Power Spectrum, in *Joint International Conference on Construction Culture, Innovation, and Management*, Dubai, 2006, 395-403.

Xia, B., Zuo, J., Wu, P., & Ke, Y. (2015). Sustainable Construction Trends in Journal Papers. In *Proceedings of the 19th International Symposium on Advancement of Construction Management and Real Estate* (pp. 169-179). Springer Berlin Heidelberg.

Zainordin, N., & Mei, C. T. Y. An Insight of Sustainable Development–A Study among Construction Professional in Malaysia.